CLAIMS

What is claimed is:

1.　　A method, comprising:

identifying a resonant condition corresponding to a target class of carbon nanotubes;

tuning a light source substantially to the resonant condition;

directing light, emitted by the light source, onto at least one nanotube of the target class of carbon nanotubes to create an optical dipole trap; and

manipulating the at least one nanotube via the light.

2.　　The method of claim 1, wherein identifying the resonant condition includes:

examining at least one carbon nanotube to identify at least one dimension corresponding to the target class of carbon nanotubes; and

exposing a carbon nanotube having the at least one dimension to a variable light source to identify a wavelength of light capable to create the optical dipole trap corresponding to the target class of carbon nanotubes.

3.　　The method of claim 1, wherein manipulating the at least one nanotube comprises sorting the at least one nanotube to separate the target class of carbon nanotubes from a mixture of carbon nanotubes.

4.　　The method of claim 1, wherein manipulating the at least one nanotube comprises rotating the at least one nanotube via rotation of a plane of polarization of the light.

5.　　The method of claim 1, wherein the light source comprises a laser.

6. The method of claim 2, wherein the at least one dimension corresponding to the target class of carbon nanotubes comprises at least one of a diameter or a length.

7. The method of claim 1, wherein directing light, emitted by the light source, onto the at least one nanotube includes scanning the light across a mixture of carbon nanotubes, the target class of carbon nanotubes comprising a portion of the mixture.

8. The method of claim 3, wherein the mixture of carbon nanotubes comprises a dispersion of carbon nanotubes in a medium.

9. An apparatus, comprising:

a light source tuned substantially to a resonant condition, the resonant condition corresponding to a target class of carbon nanotubes; and

focusing optics, optically coupled to the light source, to direct light emitted by the light source onto at least one nanotube of the target class of carbon nanotubes to create an optical dipole trap, the optical dipole trap capable to attract the at least one nanotube.

10. The apparatus of claim 9, wherein the light source and the focusing optics are configured to scan the light across a mixture of carbon nanotubes, the mixture of carbon nanotubes including the target class of carbon nanotubes.

11. The apparatus of claim 9, wherein the light source comprises a laser.

12. The apparatus of claim 9, wherein the focusing optics include at least one lens.

13. The apparatus of claim 9, further comprising a collector, the collector positioned to accumulate the target class of carbon nanotubes in response to manipulation by the light.

14.   The apparatus of claim 9, further comprising a polarizer, optically coupled to the light source.

15.   The apparatus of claim 14, wherein the polarizer is configured to rotate a plane of polarization of the light to rotate the at least one nanotube, the at least one nanotube having a longitudinal axis aligned parallel to the plane of polarization.

16.   An apparatus, comprising:

a light source tuned substantially to a resonant condition, the resonant condition corresponding to a target class of carbon nanotubes;

a beam splitter, optically coupled to the light source, to split light emitted from the light source along a first and a second optical path;

a first and a second acousto-optic modulator, optically coupled to the light source, to control the frequency of the light propagating along the first and the second optical path, respectively; and

focusing optics, optically coupled to the light source, to direct the light propagating along the first and the second optical path, respectively, onto at least one nanotube of the target class of carbon nanotubes to create an optical dipole trap capable to attract the at least one nanotube.

17.   The apparatus of claim 16, wherein the light source comprises a laser.

18.   The apparatus of claim 16, wherein the first and the second acousto-optic modulators are configured to heterodyne the frequency of the light propagating along the first and second optical paths, respectively.

19.   A system, comprising:

a carbon nanotube generator configured to synthesize a plurality of carbon nanotubes, each of the plurality of carbon nanotubes having a length and a diameter; and

an apparatus configured to sort the plurality of carbon nanotubes according to at least one of the length or the diameter, the apparatus comprising:

a light source tuned substantially to a resonant condition corresponding to a target class of carbon nanotubes, the target class of carbon nanotubes comprising at least a portion of the plurality of carbon nanotubes; and

focusing optics configured to direct light, emitted by the light source, onto at least one nanotube of the target class of carbon nanotubes to create an optical dipole trap, the optical dipole trap capable to attract the at least one nanotube.

20.   The system of claim 19, wherein the apparatus is configured to scan the light across a mixture of carbon nanotubes, the mixture of carbon nanotubes including the target class of carbon nanotubes.

21.   The system of claim 19, wherein the light source comprises a laser.

22.   The system of claim 19, wherein the focusing optics include at least one lens.

23.   The system of claim 19, wherein the apparatus further comprises a collector positioned to accumulate the target class of carbon nanotubes in response to manipulation by the light.

24.   The system of claim 19, wherein the apparatus further comprises a polarizer, optically coupled to the light source.

25.   The system of claim 24, wherein the polarizer is configured to rotate a plan of polarization of the light to rotate the at least one nanotube, the at least one nanotube having a longitudinal axis aligned parallel to the plane of polarization.

26.   A method, comprising:

synthesizing a plurality of carbon nanotubes to generate a mixture of carbon nanotubes, each of the plurality of carbon nanotubes having a length and a diameter; and

sorting the mixture of carbon nanotubes according to at least one of the length or the diameter, sorting the mixture, comprising:

identifying a resonant condition corresponding to a target class of carbon nanotubes;

tuning a light source substantially to the resonant condition;

directing light, emitted by the light source, onto at least one nanotube of the target class of carbon nanotubes to create an optical dipole trap; and

manipulating the at least one nanotube via the light.

27.   The method of claim 26, wherein identifying the resonant condition includes:

examining at least one carbon nanotube to identify at least one of the length or the diameter corresponding to the target class of carbon nanotubes; and

exposing a carbon nanotube having the at least one dimension to a variable light source to identify a wavelength of light capable to create the optical dipole trap corresponding to the target class of carbon nanotubes.

28.   The method of claim 26, wherein the light source comprises a laser.

29.   The method of claim 26, wherein directing light, emitted by the light source, onto the at least one nanotube includes scanning the light across the mixture of carbon nanotubes, the target class of carbon nanotubes comprising a portion of the mixture.

30.   The method of claim 29, wherein the mixture of carbon nanotubes comprises a dispersion of carbon nanotubes in a medium.